

Claims:

1. An X-ray apparatus for inspecting a cargo container, such apparatus comprising:

a moveable platform with an X-ray source and X-ray detector disposed on the platform on opposing sides of a scanning zone where the scanning zone may be moved along a length of the cargo container to scan a volume of the cargo container, said X-ray source being disposed in a spaced-apart relationship with respect to the scanning zone;

a precollimator disposed on the X-ray platform between the X-ray source and scanning zone, said precollimator being located proximate the scanning zone; and

an intermediate collimator disposed midway between the X-ray source and the precollimator, said intermediate collimator having a spaced-apart relationship with respect to the precollimator and to the X-ray source.

2. The X-ray apparatus as in claim 1 wherein the intermediate collimator further comprises a pair of wings for intercepting backscatter operatively extending from opposing sides of a collimating slot of the intermediate collimator towards the X-ray source.

3. The X-ray apparatus as in claim 2 wherein the pair of wings further comprises a mounting position that is set back from a center line of a collimating entrance of the intermediate collimator by a substantially equal distance.

4. The X-ray apparatus as in claim 3 wherein the set back of the pair of wings from the centerline of the collimating entrance of the intermediate collimator further comprises a

distance between the wings that is substantially equal to one percent of the distance from the X-ray source.

5. The X-ray apparatus as in claim 1 wherein the intermediate collimator further comprises an overall width that is less than 6% of a distance to the X-ray source.

6. The X-ray apparatus as in claim 1 wherein the precollimator further comprises a pair of wings for intercepting backscatter operatively extending from opposing sides of a collimating slot of the precollimator towards the X-ray source.

7. The X-ray apparatus as in claim 6 wherein the set back of the pair of wings from the centerline of the collimating entrance of the precollimator further comprises a distance between the wings that is substantially equal to one-half percent of the distance from the X-ray source.

8. The X-ray apparatus as in claim 1 wherein the precollimator further comprises an overall width that is less than 2% of a distance to the X-ray source.

9. The X-ray apparatus as in claim 1 wherein the detector further comprises a postcollimator that supports a set of detector elements, said postcollimator further comprising a pair of wings for intercepting backscatter operatively extending from opposing sides of a front face of the set of detectors towards the X-ray source.

10. The X-ray apparatus as in claim 3 wherein the set back of the pair of wings from the centerline of the collimating

entrance of the postcollimator further comprises a distance between the wings that is substantially equal to 0.2 percent of the distance from the X-ray source.

11. The X-ray apparatus as in claim 1 further comprising a source collimator disposed adjacent the X-ray source.

12. The X-ray apparatus as in claim 11 wherein the source collimator further comprises a collimating slot with an entrance having a width that is approximately one percent of a distance from a point of origin of X-rays from the X-ray source to the entrance of the source collimator.

13. The X-ray apparatus as in claim 12 wherein the source collimator further comprises a collimating slot with an exit having a width that is less than one percent of a distance from the point of origin of the X-ray source to the exit of the source collimator.

14. The X-ray apparatus as in claim 1 wherein the intermediate collimator further comprises a collimating slot with an entrance having a width that is less than one-half percent of a distance from the X-ray source to the entrance of the intermediate collimator.

15. The X-ray apparatus as in claim 14 wherein the intermediate collimator further comprises the collimating slot with an exit having a width that is about one-third percent of a distance from the X-ray source to the exit of the source collimating.

16. The X-ray apparatus as in claim 1 wherein the precollimator further comprises a collimating slot with an entrance having a width that is about one-tenth percent of a distance from the X-ray source to the entrance of the precollimator.

17. The X-ray apparatus as in claim 16 wherein the precollimator further comprises the collimating slot with an exit having a width that is about one-half millimeter larger than the entrance.

18. The X-ray apparatus as in claim 1 wherein the postcollimator further comprises a collimating slot with an entrance having a width that is about 0.05 percent of a distance from the X-ray source to the entrance of the postcollimator.

19. A non-invasive method for inspecting a cargo container, such method comprising the steps of:

providing a moveable platform with an X-ray source and X-ray detector disposed on the platform on opposing sides of a scanning zone where the scanning zone may be moved along a length of the cargo container to scan a volume of the cargo container, said X-ray source being disposed in a spaced-apart relationship with regard to the scanning zone;

disposing a precollimator on the X-ray platform between the X-ray source and scanning zone, said precollimator being located proximate the scanning zone;

disposing an intermediate collimator midway between the X-ray source and the precollimator; and

inspecting the cargo container by transmitting an X-ray beam from the X-ray source to the X-ray detector using

the intermediate collimator and precollimator to control expansion of the X-ray beam.

20. The non-invasive method for inspecting the cargo container as in claim 19 further comprising providing a pair of wings on opposing sides of a collimator slot of the intermediate collimator to control backscatter.

21. The non-invasive method for inspecting the cargo container as in claim 19 further comprising providing a pair of wings on opposing sides of a collimator slot of the precollimator to control backscatter.

22. The non-invasive method for inspecting the cargo container as in claim 19 further comprising providing a pair of wings on opposing sides of a collimator slot of the postcollimator to control backscatter.